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## ADDITIONS TO THE KNOWLEDGE OF THE CYPRAEIDAE BASED ON THE COLLECTIONS OF THE AMERICAN MUSEUM OF NATURAL HISTORY

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This paper is concerned with the extension of knowledge pertinent to the Cypraeidae from the West Indies and Pacific Ocean based on unworked collections housed in the American Museum of Natural History. Data are included to indicate size variation in certain species; specific localities are cited for species of cowries where it seems to the writer that specific island locality records are lacking in the literature; and notations concerning unusual individuals of a species are noted.

Schilder and Schilder (1939) in their monograph on living Cypraeidae have given general distributional data for the species listed here. The writer, for the past several years, has attempted to present specific island listings of cowries based on reliable collections and on collection data from experienced field collectors in the hope that in the future a monograph will be forthcoming to present accurately and specifically the distribution, especially in the Pacific, of this widely collected family of mollusks. (Ingram, 1937a, 1937b, 1938, 1939a, 1939b, 1940, 1944; and Ingram and Kenyon, 1945a, 1945b.)

The danger in compiling such lists in the future lies in the mixing of locality data with the extensive collecting during the

war that was especially directed towards such attractive shells as the cowries. (Spicer, 1941; Ingram, 1944; Ingram and Kenyon, 1945a.) During the war years shell collectors returning from the Pacific, wanting cowries identified, often interviewed the writer. It was not uncommon to have a cigar box or sack opened on my desk, revealing a hundred or so shells, to have the collector pick shells out of the pile and, without any recorded collection data and relying on memory alone, to locate them specifically to three or four island groups.

The material from the various localities was obtained by the following collectors: Santo Domingo, Armstrong Santo Domingo Expedition; Tobago, Mrs. L. Whitlock; Ie Shima, Mr. Joseph Lo Pinto; Eniwetok, Mr. Alfred Belohlavek; Tuamotu, Dr. H. L. Shapiro; Galápagos, Mr. Clarence Hay.

Appreciation is expressed to Dr. Ernst Mayr, Curator of the Whitney-Rothschild Collections, and to Mr. John C. Armstrong, Assistant Curator of Invertebrates for their cooperation in placing Cypraeidae material of the American Museum in the writer's hands.

### SPECIFIC LOCALITY LISTINGS

#### SOUTH END OF EL CAYO

##### *Cypraea cinerea* Gmelin

This species is one of the cowries which has received but little attention in the literature. The measurements of a fine series of six individuals is worthy of record;

they are as follows: 36.40-24.21, 33.80-22.10-18.80, 33-23.90-19.80, 29.60-20.60-17.10, 27.10-18.50-14.80, 25.20-18-15.90.<sup>2</sup>

##### *Cypraea spurca* Linnaeus

##### *Cypraea zebra* Linnaeus

<sup>2</sup> Measurements are in millimeters and approximate to the nearest tenth of a millimeter; the measurement sequence is length, width, and height.

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## TOBAGO, WEST INDIES

*Cypraea cinerea* Gmelin

The measurements of 10 beach shells are added here to those of this species from El Cayo: 36.60-23.19.40, 34.50-22.18.70, 33.70-21.10-18.10, 27.80-17.70-15.80, 26.30-16.50-14, 26.20-16.50-13.80, 27-17-14.60, 26.70-17-14.60, 25.40-17.40-15.20, 25.50-16-14.

*Cypraea spurca* Linnaeus

## IE SHIMA OFF OKINAWA, JAPAN

*Cypraea annulus* Linnaeus*Cypraea caputserpentis* Linnaeus*Cypraea lynx* Linnaeus

## ENIWETOK, MARSHALL ISLANDS

Eniwetok (Brown) Atoll is situated at approximately 11° 21' N., 162° 20' E., 165 miles westward of Bikini Atoll. It is 21 miles long in a northwest and southeast direction. Three natural entrances lead into the lagoon.

*Cypraea annulus* Linnaeus*Cypraea carneola* Linnaeus*Cypraea caputserpentis* Linnaeus*Cypraea intermedia* Gray*Cypraea moneta* Linnaeus*Cypraea poraria* Linnaeus*Cypraea ventriculus* Lamarck

Four freshly collected specimens are in the collection. They vary in size from 54-33-25.60, 43.80-29.40-22, 41.20-27-19.10, 38.60-25-18.

## PENRHYN, TONGAREVA ISLAND

Penrhyn, Tongareva Island, one of the scattered islands near the Equator commonly referred to as the Line Islands, is situated at 09° 00' S., 158° 03' W. and consists of numerous low islets. Locally this island, under the Dominion of New Zealand, is known as Mangorongoro. The lagoon is studded with coral heads, and three passes open into it. The entire atoll is approximately 12 miles long by 7 miles wide.

*Cypraea annulus* Linnaeus

Mature individuals of this species varied in size from 24.90-18.40-12 to 9-5.70-4.20. Three specific collections showed the following variations in size: collection 1, five individuals, 24.90-18.40-12 to 17.50-12.70-

8.50; collection 2, 17 individuals, 12-7.20-5.50 to 9-5.70-4.20; collection 3, 22 individuals, 13-9.50-6.70 to 9.50-6.50-4.90. Two individuals are nearly circular in outline.

*Cypraea caputserpentis* Linnaeus*Cypraea carneola* Linnaeus*Cypraea erosa* Linnaeus*Cypraea fimbriata* Gmelin*Cypraea helvola* Linnaeus*Cypraea irrorata* Gray*Cypraea isabella* Linnaeus

Eight individuals show such a variation in size that it is worthy of recording here. All specimens are mature, and the largest is slightly more than twice as large as the smallest: 36-20-17, 27-14-12, 25.20-13.20-12, 25-13.60-11.80, 24.50-13-11, 23.50-12-10, 20-10-8.50, 17.70-9-7.50.

*Cypraea intermedia* Gray*Cypraea moneta* Linnaeus

One collection of 17 individuals illustrates the great size variation present among the great majority of species of Cypraeidae. Such variation may lead those who have not collected large series of individuals of a species to think that a new species may be in hand, unless extensive series are studied. Subspecific division of a species based on size seems hardly justified with the great variation existing in the Cypraeidae.

The largest individual measures 31-23.80-16 and the smallest 18-11.50-8.90. The mean measurements for the 17 individuals was approximately 25-18-12.

A yellow annulus is well defined on the dorsum of seven, ill defined on eight, and entirely absent on two individuals. Nine individuals have the lateral nodules on the shell well developed and in eight they are either poorly developed or absent.

*Cypraea poraria* Linnaeus*Cypraea punctata* Linnaeus*"Pustularia" cicercula* (Linnaeus)*Nuclearia nucleus* (Linnaeus)

## NAPUKA ISLAND, TUAMOTU ARCHIPELAGO

Napuka, situated at 14° 09' S., 141° 14' W., consists of a series of islets connected by an irregular coral reef. The lagoon has no passage.

*Cypraea arenosa* Gray

*Cypraea caputserpentis* Linnaeus

*Cypraea intermedia* Gray (= *Cypraea depressa* Gray)

One not fully mature individual is among the largest specimens that the writer has seen; it measures 42-27.50-22. Two fully mature individuals measure 38-28-20 and 30-23-15.15.

*Cypraea lynx* Linnaeus*Cypraea moneta* Linnaeus

Nine individuals of this species from one collection show an interesting color variation: five have a yellow base and a milk white dorsum and lateral margins; two have a yellow-tinged dorsum and a white base; and two have the base and dorsum yellow tinged, the yellow on the base being the more prominent.

*Cypraea scurra* Chemnitz

## FANGATAUFA (COCKBURN) ISLAND, TUA-MOTU ARCHIPELAGO

Fangataufa (Cockburn) Island is located at 22° 15' S., 138° 45' W. It is a small oblong atoll 5 miles long by 3 miles wide. There is no passage into the lagoon.

*Cypraea arenosa* Gray

*Cypraea intermedia* Gray (= *Cypraea depressa* Gray)

Two adults measure 40.40-29-20.60 and 33-23.50-15.90.

*Cypraea talpa* Linnaeus

## GALÁPAGOS ISLANDS

These islands represent a Pacific outpost for cowries found in the coastal waters of Central and South America; thus collections from the Galápagos Islands should be given especial consideration to see what species are filtering into the islands. The continental Cypraeidae of the western Americas which have reached these islands

are: *Cypraea albuginosa* Gray, *Cypraea arabicula* Lamarck, *Cypraea cervinetta* Kiener, *Cypraea isabella mexicana* Stearns, *Cypraea nigropunctata* Gray, and *Pustularia pustulatata* (Lamarck). A number of writers have dealt with the molluscan fauna of these islands, among which are notably Dall and Ochsner (1928), Hertlein (1937), Hertlein and Strong (1939), Pilsbry and Vanatta (1902), Stearns (1893), Tomlin (1927), and Wimer (1880); only Ingram (in press) has considered the Cypraeidae as a unit. The only Polynesian species to move into the Galápagos cowry fauna is *Cypraea moneta* Linnaeus. (Hertlein, 1937; Ingram, in press.)

Other outpost areas off the shores of the Americas where mollusks from the shore waters of Central and South America intermingle with those from Polynesia are Cocos Island, Clipperton Island, Tres Marias Island, and Revillagigedo Islands. (Hertlein, 1937).

## VILLAMIL SETTLEMENT, SOUTHEAST ALBEMARLE

*Cypraea cervinetta* Kiener

The measured individuals are small compared with other specimens that the writer has examined from the Galápagos Islands. (Ingram, in press.) Five individuals vary in size from 72-45-27.60 to 59.70-29.30-22.50. The three intermediate individuals measure 68.50-33-25.40, 67-30-24, 65.80-31-24.80.

*Cypraea nigropunctata* Gray

Thirty-one individuals collected as beach shells vary in size from 35-20.20-16.60 to 20.50-11.50-9.50.

## CHARLES ISLAND

*Cypraea nigropunctata* Gray

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